



100 → struct  
102 → {  
104 → Unsigned int a : 1;  
106 → Unsigned int b : 2;  
106 → Unsigned int c : 8;  
106 → } abc

Fig.1 (Prior Art)

108 → abc.b = value  
110 → readvalue = abc.b

Fig.2 (Prior Art)

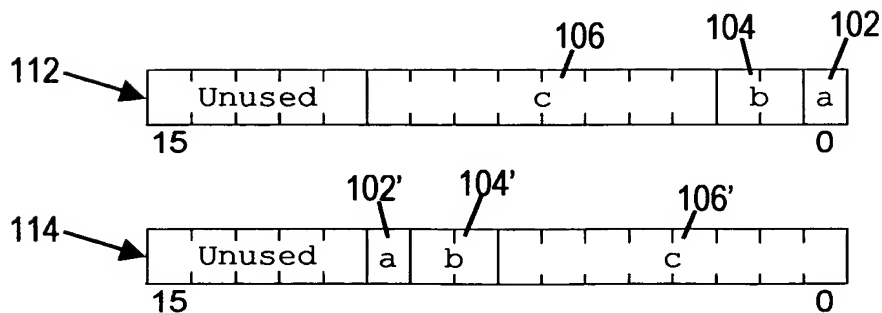


Fig.3 (Prior Art)



```

116 → unsigned int abc;
118 → #define MASK_a 0001 // 0000000000000001
120 → #define MASK_b 0006 // 0000000000000110
122 → #define MASK_c 07f8 // 0000011111111000
124 → #define SHIFT_a 0000
126 → #define SHIFT_b 0001
128 → #define SHIFT_c 0003
  
```

Fig.4 (Prior Art)

```

130 → abc = (abc AND ~MASK_b) OR (value << SHIFT_b)
132 → readvalue = (abc AND MASK_b) >> SHIFT_b
  
```

Fig.5 (Prior Art)

	abc		YYYYYYYYYYYYYYYY	← 134
	~MASK_b		111111111111001	← 136
	abc AND ~MASK_b		YYYYYYYYYYYYY00Y	← 138
	value		000000000000011	← 140
	value << SHIFT_b		0000000000000110	← 142
(abc AND ~MASK_b) OR (value << SHIFT_b)			YYYYYYYYYYYYY11Y	← 144

Fig.6 (Prior Art)



200 → #define <name of bit-field> <BFDN>u

Fig.7

202                      204  
    ↓                      ↓  
BFDN ← LEFT-BIT:RIGHT-BIT

Fig.8

212  
    ↓  
Struct  
    {  
        Unsigned long field;  
        #define a 0000u  
        #define b 0201u  
        #define c 1003u  
    } abc  
                         206  
                         |  
                         208      210

Fig.9

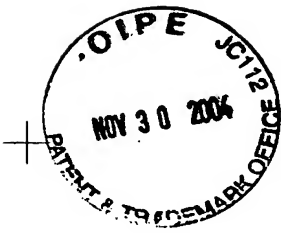
214  
    ↓  
Struct  
    {  
        Unsigned long field;  
        #define a 1010u  
        #define b 908u  
        #define c 700u  
    } cba  
                         216  
                         |  
                         218      220

Fig.10

222 → WRITE\_BITFIELD(abc, b, value)

224 → readvalue = READ\_BITFIELD(abc, b)

Fig.11



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```

226  #define LEFTBIT(BFDN) (BFDN / 100)
227  #define RIGHTBIT(BFDN) (BFDN % 100)
228
229  #define FIELDMASK(BFDN) \
230      (~(fffe << (LEFTBIT(BFDN) - RIGHTBIT(BFDN))) << RIGHTBIT(BFDN))
231
232  #define READ_BITFIELD(ADDRESS, BFDN) \
233      ((ADDRESS AND FIELDMASK(BFDN)) >> RIGHTBIT(BFDN))
234
235  #define WRITE_BITFIELD(ADDRESS, BFDN, VALUE) \
236      (ADDRESS = ((ADDRESS AND ~FIELDMASK(BFDN)) | \
237      ((VALUE << RIGHTBIT(BFDN)) AND FIELDMASK(BFDN))))
  
```

Fig.12

```

236  ADDRESS | abc = YYYYYYYYYYYYYYYY
238  BFDN | b = 0201
240  VALUE | 3 = 0000000000000011
242  LEFTBIT(0201) | 02
244  RIGHTBIT(0201) | 01
246  FIELDMASK(0201) |
248  LEFTBIT - RIGHTBIT | 1
250  Fffe << 1 | 1111111111111100
252  ~(Fffe << 1) | 0000000000000011
254  (~(Fffe << 1)) << 01 | 0000000000000110
256  WRITE_BITFIELD(abc, b, 3):
258  ~FIELDMASK | 11111111111111001
260  abc AND ~FIELDMASK | YYYYYYYYYYYY00Y
262  VALUE << RIGHTBIT | 0000000000000110
264  {VALUE << RIGHTBIT} AND FIELDMASK | 0000000000000110
266  ADDRESS | YYYYYYYYYYYY11Y
  
```

Fig.13